

NICAM ensemble coupling calculation using h3-Open-UTIL/MP coupler

*Takashi Arakawa^{1,3}, Hisashi Yashiro², Kengo Nakajima³

1. CliMTEch Inc., 2. National Institute for Environmental Studies, 3. Univ. of Tokyo

Meteorological phenomena are highly nonlinear, and small differences in initial values can significantly affect the results. Therefore, ensemble calculations are a common method to reduce the inevitable uncertainty inherent in individual simulations and to quantitatively evaluate the degree of uncertainty. On the other hand, coupled calculations, in which multiple model components exchange data while simulation process, are also a very commonly used computational method in the weather and climate field. The atmospheric model NICAM has a well-developed mechanism for performing ensemble calculations, and a mechanism for coupling the ocean model COCO or two NICAMs of different resolutions have been implemented. Therefore, in this study, ensemble coupling, in which multiple low-resolution NICAMs are run simultaneously and coupled with a high-resolution NICAM, was implemented. A general-purpose coupler, h3-Open-UTIL/MP, was used for the coupling. The h3-Open-UTIL/MP was developed as part of the h3-Open-BDEC project and has been designed and developed with ensemble coupling as one of its main functions from the initial stage. Two execution modes are possible: many-to-one coupling, where multiple ensemble runs are coupled to a single model, and many-to-many coupling, where multiple coupled models are executed as an ensemble. As mentioned earlier, a many-to-one coupling was performed in this study. In this coupling method, data from the many-side are averaged and sent to the one-side. On the other hand, the data sent from the one-side is distributed directly to the many-side. In this presentation, the details of the software that implements the ensemble coupling will be explained and the computational performance will be discussed.

Keywords: Atmospheric Model, ensemble simulation, coupled simulation

